REMARKS

The Non-Final Office Action mailed July 9, 2008, has been received and carefully reviewed. As of the July 9, 2008 Office Action, Claims 1-29, 31-34 and 48-53 were pending and presently stand rejected. Applicant has amended Claim 1.

As of this AMENDMENT D, Claims 1-29, 31-34 and 48-53 are believed to be in condition for allowance and Applicant respectfully requests reconsideration of the application as argued herein.

35 U.S.C. § 103(a) Obviousness Rejections

The Supreme Court in *KSR International Co. v. Teleflex Inc.*, reaffirmed the objective analysis for determining obviousness under 35 U.S.C. § 103: "[T]he scope and content of the prior art are . . . determined; differences between the prior art and the claims at issue are . . . ascertained; and the level of ordinary skill in the pertinent art resolved." 127 S.Ct. 1727, 1729-30, (U.S. 2007) (quoting *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966)).

M.P.E.P. 706.02(j) sets forth the contents of a Section 103(a) rejection:

> To support the conclusion that the claimed invention is directed to obvious subject matter, either the references must expressly or impliedly suggest the claimed invention or the examiner must present a convincing line of reasoning as to why the artisan would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clap*, 227 U.S.P.Q. 972, 973 (Bd. Pat. App. & Inter. 1985).

<u>Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No. 6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter</u>

The Examiner has rejected Claims 1-2 and 20-23 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. in view of Amerson et al., Bourn et al. and Walter. Applicant has amended Claim 1 to remove the redundant recitation of the frequency range for visible light, "(400 to 750 nm)".

Applicant's Claim 1 and all subsequent Claims are directed to an apparatus, namely "an LED array formed of a plurality of LEDs, each uniquely colored LED or group of identically colored LEDs comprising a dominant wavelength within the visible

spectrum", that generates a very specific quality of light. That particular quality of light is defined by the limitation: "wherein relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range". The prior art of record does not disclose such an apparatus that generates this particular quality of light.

Applicant acknowledges that Muthu et al. teaches an LED array comprising three distinct narrowband colors, red, green and blue. Applicant acknowledges that Amerson et al. teaches an LED array comprising four distinct narrowband colors, red, green, blue and amber. Applicant acknowledges that Bourn et al. teaches an LED array comprising two or more narrowband colors "selected from the following: infra-red, red, amber, yellow, green, blue, violet, ultraviolet, or white in color." Col. 3:40-44. Applicant acknowledges that Walters teaches the frequency range of the visible spectrum of light. FIGS. 5E-5F.

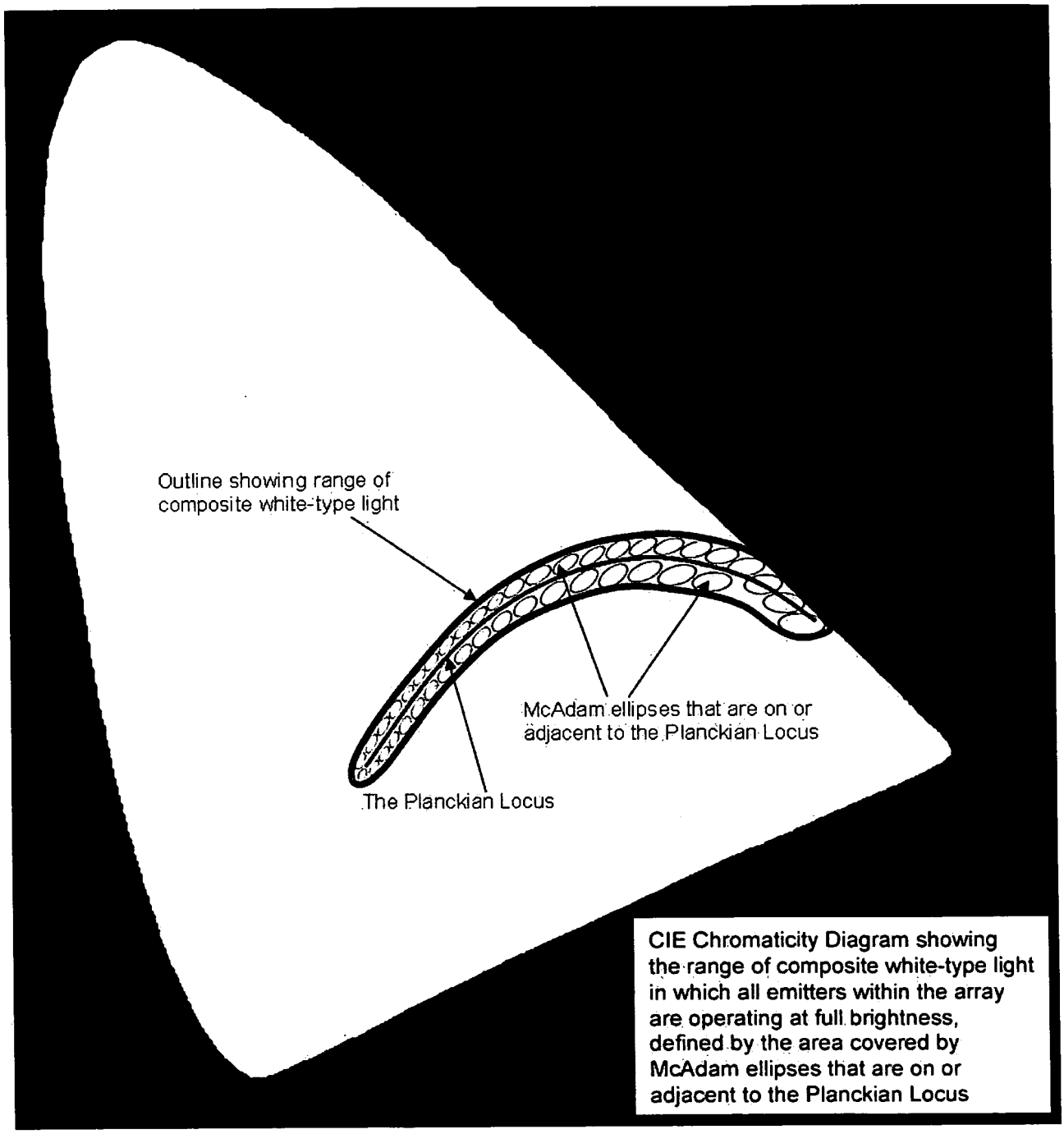
The Examiner concedes that Muthu et al., Amerson et al., Bourn et al. and Walter do not explicitly teach "wherein relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range" as recited in Claim 1.

However, the Examiner asserts that "one of ordinary skill in the art would know that visible light is capable of being plotted on a CIE Chromaticity diagram within McAdam ellipses that are on or adjacent to a Planckian Locus within a predefined correlated color temperature range." This assertion by the Examiner is factually incorrect.

For example, FIG. A (below) is a CIE Chromaticity Diagram showing the range of composite white-type light in which all emitters within the array are operating at full brightness, defined by the area covered by the plurality of McAdam ellipses that are on or adjacent to the Planckian Locus. It will be understood that in FIG. A the McAdam ellipses and Planckian Locus are NOT DRAWN TO PRECISE SCALE but are simplified

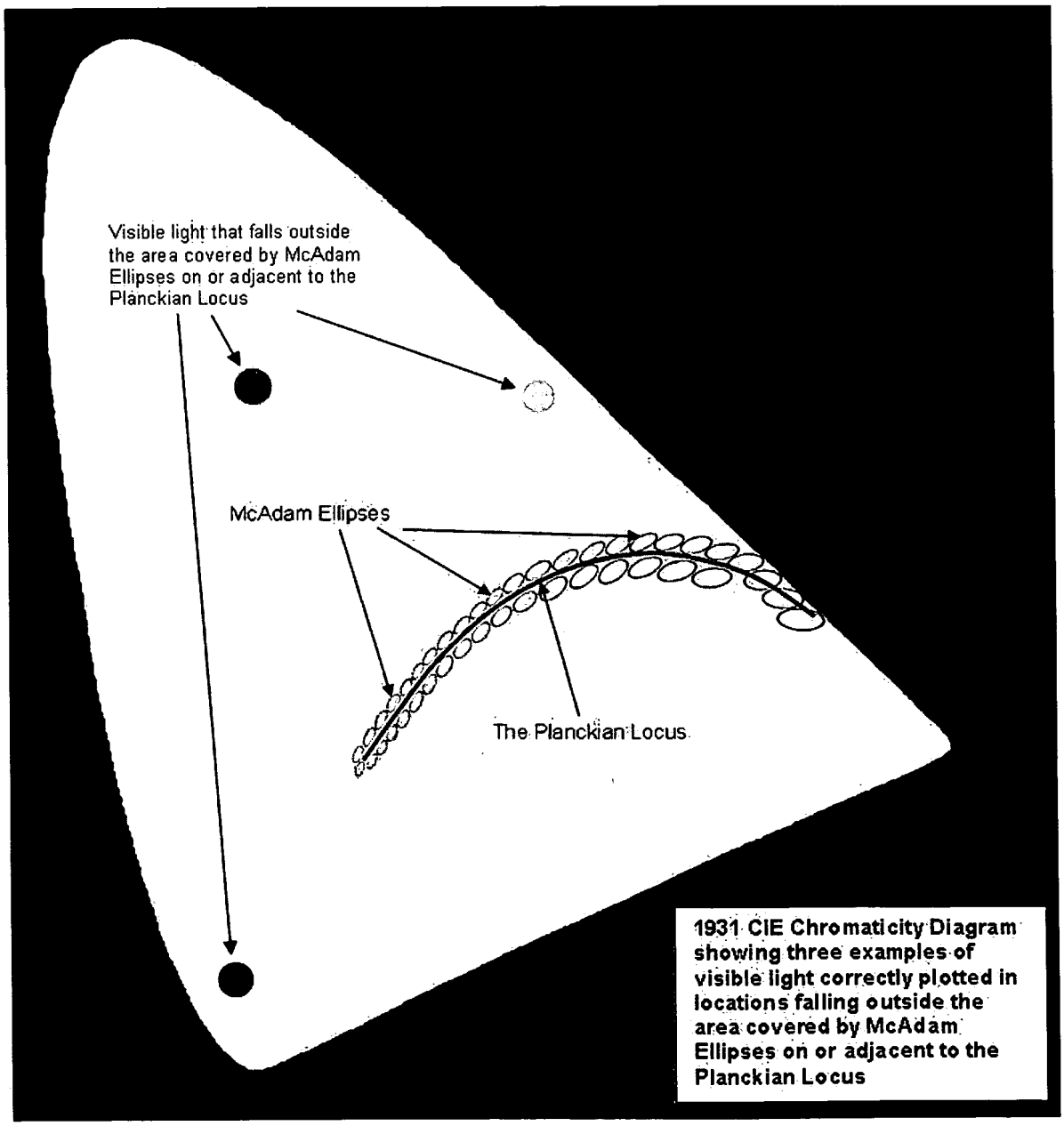
and/or exaggerated for illustrative purposes only. Anyone with ordinary skill in the art will recognize this limitation and will also be fully able to conceive the area as actually defined in Claim 1.

FIG. A



Thus, any "visible light" outside of the "outline" but that can be plotted on the CIE Chromaticity Diagram would be examples of "visible light" plotted on a CIE chromaticity diagram within McAdam ellipses that are **NOT** on or adjacent to a Planckian Locus within a predefined correlated color temperature range, and therefore outside the scope of Claim 1. It should be readily apparent that the vast majority of "visible light" falls outside the limitations of Claim 1.

FIG. B



As further illustration, FIG. B (above) shows three examples of "visible light" that fall outside the limitations of Claim 1. The examples are of visible light with either a greenish hue, a bluish hue, or a yellowish hue, correctly plotted on the CIE Diagram. It should be apparent that there are an infinite number of examples of "visible light" that may be similarly plotted on the CIE Diagram outside the limitations of Claim 1.

Thus, Applicant seeks further clarification and preferably documentary support for the Examiner's assertion that "one of ordinary skill in the art would know that visible light is capable of being plotted on a CIE Chromaticity diagram within McAdam ellipses that are on or adjacent to a Planckian Locus within a predefined correlated color temperature range."

The Examiner has apparently asserted this fact under "official notice" without any documentary evidence for support. Applicant would like to remind the Examiner that official notice without documentary evidence to support an examiner's conclusion is permissible only in some circumstances. While "official notice" may be relied on, these circumstances should be rare when an application is under final rejection. MPEP § 2144.03. Official notice unsupported by documentary evidence should only be taken by the Examiner where the facts asserted to be well-known, or to be common knowledge in the art are capable of instant and unquestionable demonstration as being well-known. *In re Ahlert*, 424 F.2d 1088, 1091 (C.C.P.A. 1970). It would not be appropriate for the Examiner to take official notice of facts without citing a prior art reference where the facts asserted to be well known are not capable of instant and unquestionable demonstration. *Id.* For example, assertions of technical facts in the areas of esoteric technology or specific knowledge of the prior art must always be supported by citation to some reference work recognized as standard in the pertinent art. *In re Ahlert*, 424 F.2d at 1091; see also *In re Grose*, 592 F.2d 1161, 1167-68 (C.C.P.A. 1979). It is never appropriate to rely solely on "common knowledge" in the art without evidentiary support in the record, as the principal evidence upon which a rejection was based. *In re Zurko*, 258 F.3d 1379, 1385 (Fed. Cir. 2001) ("[T]he Board cannot simply reach conclusions based on its own understanding or experience—or on its assessment of what would be basic knowledge or common sense. Rather, the Board must point to some concrete evidence in the record in support of these findings.").

As stated in Applicant's specification, the CIE chromaticity diagram, McAdam ellipses and the Planckian Locus are all concepts and terms well known to one of ordinary skill in the art. See Specification, paragraph [0045]. The CIE chromaticity diagram maps all colors perceivable by humans, plotted with the CIE parameters x and y. The Planckian Locus is the path (or locus) of points on the CIE diagram that map the color of a blackbody radiator as the blackbody temperature changes. As the temperature of a blackbody radiator increases, its color passes along the Planckian Locus from an orange color, to a 'warm' orange-tinted white, through a 'pure' white, and to a 'cool' blue-tinted white. A particular color of white is characterized by its correlated color temperature, which is the temperature of a blackbody radiator that most closely matches the particular color of white being characterized. A McAdam ellipse is a region on the CIE diagram in which colors are indistinguishable from each other to the human eye.

Thus, the claim language "on or adjacent to a Planckian Locus within a predefined correlated color temperature range," is understood to mean a color that is the same as or near to a 'shade' of white produced by a blackbody radiator of a predefined temperature. The claim language "falls within a McAdam ellipse that is on or adjacent to a Planckinan Locus within a predefined correlated color temperature range," is understood to describe regions wherein colors are indistinguishable from the 'shade' of white produced by the blackbody radiator of the predefined temperature. The claim language "a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that are on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range," is understood to mean a white color whose CIE x and y parameters fall within one of the regions wherein colors are indistinguishable from the 'shade' of white produced by the blackbody radiator of the predefined temperature.

Returning to the Examiner's assertion that "one of ordinary skill in the art would know that visible light is capable of being plotted on a CIE Chromaticity diagram within McAdam ellipses that are on or adjacent to a Planckian Locus within a predefined correlated color temperature range," the Applicant agrees that any visible light source, including LEDs, is capable of being plotted on a CIE chromaticity diagram.

However, from the above discussion it should be apparent that a person of ordinary skill in the art would be aware that many visible light sources ***are not, in fact,*** capable of being plotted on a CIE Chromaticity diagram ***within McAdam ellipses that are on or adjacent to a Planckian Locus within a predefined correlated color temperature range***, see the above examples. These are very specific limitations recited in Claim 1 that are nowhere to be found or suggested in the cited prior art. Therefore, Applicant seeks clarification from the Examiner regarding this assertion along with documentary evidence for support.

Claims 2 and 20-23 depend from previously amended Claim 1. In view of the above arguments, Applicant respectfully requests reconsideration of the Examiner's obviousness rejection of Claims 1-2 and 20-23 based on the asserted combination of Muthu et al. in view of Amerson et al., Bourn et al. and Walter.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No. 6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter as applied to Claim 1 and further in view of LEDTRONICS, Inc. (100-02a.htm)

The Examiner has rejected Claims 3-5 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al. in view of Amerson et al., Bourn et al. and Walter as applied to Claim 1 and further in view of LEDTRONICS, Inc. (100-02a.htm). The Examiner concedes that neither Muthu et al. nor Amerson et al. nor Bourn et al. nor Walter teaches LEDs producing colored light with a spectral half-width of less than about 60 nm, 40 nm, or 30 nm. However, the Examiner asserts that LEDTRONICS, Inc. (100-02a.htm) teaches LEDs having spectral half-widths ranging from 90 nm down to 20 nm. The Examiner further asserts that "it would have been obvious at the time the invention was made to use the LEDs of LEDTRONICS for the array of LEDs of Muthu et al. within the visible spectrum as noted by Walter since the LEDs of LEDTRONICS provide a greater range of spectral emissions in order to achieve white light." Office Action p. 5, ll. 3-7.

Applicant notes that the Examiner's suggested motivation—to "provide a greater range of spectral emissions"—is contrary to the language of Claims 3-5. Progressively

narrower spectral half-widths, by definition, provide progressively ***smaller*** ranges of spectral emissions, rather than greater ranges as asserted by the Examiner.

As such, Applicant seeks clarification regarding how the spectral half-widths recited in Claims 3-5 "provide a greater range of spectral emissions in order to achieve white light" as asserted by the Examiner? The spectral half widths specified in Claims 3-5 narrow the spectral emissions relative to the unlimited Claim 1. Thus, it seems readily apparent that Claims 3-5 do not "provide a ***greater*** range of spectral emissions in order to achieve white light" as suggested by the Examiner. Rather, they provide ***narrower*** ranges of spectral emissions. Claims 3-5 ***further restrict*** the invention within Claim 1; they do not broaden it.

Claims 3-5 depend from previously amended Claim 1. As argued above, Muthu et al., Amerson et al., Bourn et al. and Walter fail to teach or suggest all of the limitations of previously amended Claim 1. It is readily apparent that LEDTRONICS, Inc. (100-02a.htm) by itself does not teach or suggest "wherein relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range" as recited in Claim 1.

For all of these reasons, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 3-5.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No. 6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter as applied to Claim 1 and further in view of LEDTRONICS, Inc. (38.htm)

The Examiner has rejected Claims 6-7, 9-10, 12-13 and 15-19 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al., Amerson et al., Bourn et al., Walter and further in view of LEDTRONICS, Inc. (38.htm).

The Examiner concedes that Muthu et al., Amerson et al., Bourn et al. and Walter do not teach the specific limitations in Claims 6-7, 9-10 and 12-13. The Examiner further asserts that LEDTRONICS, Inc. (38.htm) teaches all of the colors

within a specified distance of the recited associated wavelengths in Claims 6-7, 9-10 and 12-13. However, none of the cited references teach an LED array having all the limitations of Claim 1 and all of the limitations of each of Claims 6-7, 9-10 and 12-13. LEDTRONICS, Inc. (38.htm) is simply an "LED Color Chart" listing characteristics of discrete LEDs offered by Ledtronics, Inc. LEDTRONICS, Inc. (38.htm) does not teach LED arrays, let alone LED arrays having the limitations of Claim 1. There is no teaching or suggestion in LEDTRONICS, Inc. (38.htm) itself to select the particular colors recited in Claims 6-7, 9-10 and 12-13 and assemble them in LED arrays having the recited characteristics. The Examiner has already conceded that there is no such teaching in Muthu et al., Amerson et al., Bourn et al. and Walter.

The Examiner has not provided specific reasoning why one of skill in the art, at the time the present invention was made, who in possession of the disclosures of Muthu et al., Amerson et al., Bourn et al., Walter and further in view of LEDTRONICS, Inc. (38.htm) would have made the particular selections of colors and associated dominant wavelengths recited in Claims 6-7, 9-10 and 12-13. Applicant requests clarification from the Examiner regarding such specific reasoning and documentary evidence of where it may be found in the art of record or elsewhere, so that Applicant can properly address this obviousness rejection.

The Examiner concedes that Muthu et al., Amerson et al., Bourn et al. and Walter do not teach the specific limitations in Claims 15-17, namely "wherein each dominant wavelength is separated from its nearest neighbor on either side by not more than 40 nm", "30 nm" and "20 nm", respectively. The Examiner further asserts that LEDTRONICS, Inc. (38.htm) teaches each dominant wavelength being separated from its nearest neighbor on either side by not more than about 40 nm, 30, nm or 20 nm. Office Action p. 7, ll. 7-9. As already noted above, LEDTRONICS, Inc. (38.htm) does not teach LED arrays, let alone an LED array having the limitations of Claim 1. There is no teaching or suggestion in LEDTRONICS, Inc. (38.htm) itself to select the particular separations from dominant wavelengths as recited in Claims 15-17.

Again, the Examiner has not provided specific reasoning why one of skill in the art, at the time the present invention was made, who in possession of the disclosures of Muthu et al., Amerson et al., Bourn et al., Walter and further in view of LEDTRONICS,

Inc. (38.htm) would have assembled an LED array according to the limitations of Claim 1 and then separated each dominant wavelength in the manners recited in Claims 15-17. Applicant requests clarification from the Examiner regarding such specific reasoning and documentary evidence of where it may be found in the art of record or elsewhere, so that Applicant can properly address this obviousness rejection.

Regarding Claim 18, the Examiner appears to acknowledge that Muthu et al., Amerson et al., Bourn et al. and Walter do not teach the specific limitations in Claim 18, but further asserts that LEDTRONICS, Inc. (38.htm) "teaches the dominant wavelengths gradually increasing away from either side of approximately 555nm. 560 nm, 564 nm, 569 nm (is gradually increasing in a positive direction) or 528 nm, 502 nm, or 460 nm (is gradually increasing in a negative direction). In this case 560 nm is approximately 555 nm." Office Action, p. 7, ll. 9-13.

While the Examiner's statement may be true, that is not what is recited in Claim 18. There is a significant distinction between the Examiner's phrase "gradually increasing away from either side" and the recitation "wherein **separation between** the dominant wavelengths gradually increases away from either side", of Claim 18, emphasis added. The separations in the prior art cited by the Examiner between 555 nm and the adjacent colors in the positive direction are 5 nm (560-555), 4 nm (564-560) and 5 nm (569-564). This progression of "separations" measured in the positive direction, *i.e.*, 5 nm, 4 nm, 5 nm, does not increase gradually as recited in Claim 18. In fact, it goes down when measuring the separation between 560 nm and 564 nm. Similarly, the "separation" between adjacent colors in the negative direction away from 555 nm (528 nm, 502 nm and 460 nm) is not gradually increasing. More specifically, the separations between adjacent dominant wavelengths in the negative direction measured from 555 nm in the LEDTRONICS, Inc. (38.htm) reference are: 27nm, 26 nm and 42 nm. Again, the progression of separations (in the negative direction) between adjacent dominant wavelengths DOES NOT gradually increase. In view of this analysis, Applicant asserts that Claim 18 is independently novel and non-obvious over the asserted combination of Muthu et al., Amerson et al., Bourn et al., Walter and further in view of LEDTRONICS, Inc. (38.htm).

Furthermore, the Examiner has not provided specific reasoning why one of skill in the art, at the time the present invention was made, who in possession of the disclosures of Muthu et al., Amerson et al., Bourn et al., Walter and further in view of LEDTRONICS, Inc. (38.htm) would have assembled an LED array according to the limitations of Claim 1 "wherein separation between the dominant wavelengths gradually increases away from either side of approximately 555 nm" as recited in Claim 18. Applicant requests clarification from the Examiner regarding such specific reasoning and documentary evidence of where it may be found in the art of record or elsewhere, so that Applicant can properly address the obviousness rejection of Claim 18.

Claims 6-7, 9-10, 12-13 and 15-19 all depend from Claim 1. It is readily apparent that LEDTRONICS, Inc. (38.htm) does not teach or suggest "wherein relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range" as recited in Claim 1. For this reason, Claims 6-7, 9-10, 12-13 and 15-19 are believed to be nonobvious over Muthu et al., Amerson et al., Bourn et al., Walter and further in view of LEDTRONICS, Inc. (38.htm).

Regarding Claim 19, Applicant acknowledges that LEDTRONICS, Inc. (38.htm) discloses discrete LEDs with a dominant wavelength in the near-ultra-violet region. However, Applicant seeks clarification regarding the Examiner's stated reasoning for combining Muthu et al., Amerson et al., Bourn et al., Walter and further in view of LEDTRONICS, Inc. (38.htm) to obtain the invention recited in Claim 19. Specifically, the Examiner states that "it would have been obvious at the time the invention was made to use the LEDS of LEDTRONICS for the array of LEDs of Muthu et al. within the visible spectrum as noted by Turnbull et al. since the LEDs of LEDTRONICS provide a greater range of spectral emissions in order to achieve white light." Office Action, p. 8, ll. 4-7. If the Examiner's reasoning, to "provide a greater range of spectral emissions in order to achieve white light" is correct, why would one of ordinary skill in the art select the near-ultra-violet range as opposed to some other nonvisible spectral range, *e.g.*, ultraviolet range, infrared, X-ray, etc.? What basis in the art of record or any other

source suggests that adding near-ultra-violet LEDs to visible spectrum LEDs will achieve "white light"? Applicant asserts that the addition of near-ultra-violet LEDs to visible-spectrum LEDs may have no effect upon the Examiner's stated goal of achieving white light. Applicant needs clarification on the asserted reasoning to fully respond to the rejection of Claim 19.

As argued above, Muthu et al., Amerson et al., Bourn et al. and Walter fail to disclose or suggest all of the limitations in Claim 1. LEDTRONICS, Inc. (38.htm) also fails to disclose or suggest all of the limitations in Claim 1. Thus, Claims 6-7, 9-10, 12-13 and 15-19 are believed to be nonobvious for at least the same reasons as Claim 1.

For all of the above reasons, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 6-7, 9-10, 12-13 and 15-19.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No. 6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter and LEDTRONICS, Inc. (38.htm) as applied to Claim 1 and further in view of The LED Museum (ledleft.htm)

The Examiner has rejected Claims 8, 11 and 14 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al., Amerson et al., Bourn et al., Walter and LEDTRONICS, Inc. (38.htm) and further in view of The LED Museum (ledleft.htm).

The Examiner concedes that Muthu et al., Amerson et al., Bourn et al. and Walter do not teach specified colors within 25 nm of associated dominant wavelengths. The Examiner asserts, and Applicant acknowledges, that LEDTRONICS, Inc. (38.htm) and The LED Museum (ledleft.htm) teach "discrete LEDs" having the colors specified in Claims 6, 9 and 12, and within 5 nm of an associated dominant wavelength as specified in Claims 8, 11 and 14, respectively.

However, Applicant seeks clarification regarding the Examiner's suggested reasoning for specifying colors within 5 nm of an associated dominant wavelength as recited in Claims 8, 11 and 14. The Examiner asserts that "it would have been obvious at the time the invention was made to use the LEDs of LEDTRONICS for the array of LEDs of Muthu et al. within the visible spectrum as noted by Walter, since the LEDs of

LEDTRONICS provide a greater range of spectral emissions in order to achieve white light."

Applicant seeks clarification from the Examiner regarding why the specification of the LEDs within 5 nm of an associated dominant wavelength as recited in Claims 8, 11 and 14, will "provide a greater range of spectral emissions in order to achieve white light", versus the unlimited specifications recited in Claims 6, 9 and 12? It seems readily apparent to Applicant that applying a limitation on the distance from any number of given dominant color wavelengths, as recited in Claims 8, 11 and 14 will not "provide a greater range of spectral emissions" as asserted by the Examiner. Applicant needs the Examiner's clarification regarding the asserted reasoning to properly address this obviousness rejection.

Applicant also seeks clarification from the Examiner regarding why "a greater range of spectral emissions" will "achieve white light." One of ordinary skill in the art understands that light that has a white-type appearance may be comprised of as few as two different dominant wavelengths (known in the art as "binary-complimentary" wavelengths) or as many as an infinite number of dominant wavelengths. It is also understood that in order for a light source to appear white, all dominant wavelengths and spectral emissions within the light source must be very precisely balanced in their intensities relative to one another; otherwise, the light source appears colored and not white. Therefore, it is understood that the inclusion of more spectral emissions within a light source is at least as likely to ***imbalance*** the overall composite appearance and make the light appear ***less white*** (e.g. more colored.) Applicant seeks the Examiner's clarification and documentary evidence regarding the assertion that "a greater range of spectral emissions" correlates without exception to the achievement of "white light."

Finally, Claims 8, 11 and 14 depend from amended Claim 1. Applicant's review of the Examiner's asserted combination of Muthu et al. and Turnbull et al. and Amerson et al. and LEDTRONICS, Inc. (38.htm) and further in view of The LED Museum (ledleft.htm) does not appear to teach or suggest all of the limitations of amended Claim 1. More specifically, the cited prior art references do not teach or suggest "relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity

diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range" as recited in amended Claim 1.

For all of these reasons, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 8, 11 and 14.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No. 6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter as applied to Claim 1

The Examiner has rejected Claims 24-26 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al., Amerson et al., Bourn et al. and Walter. With regard to Claims 24-26, the Examiner concedes that Muthu et al., Amerson et al., Bourn et al. and Walter fail to teach or suggest the power limitations recited in Claims 24-26. Yet, the Examiner asserts that it "would have been obvious to one skilled in the art at the time the invention was made to perform testing to acquire the optimal Wattage values because this would ensure that the LEDs would not overheat." Office Action, p. 10, ll. 5-10.

As an initial matter, Applicant notes that of all of the discrete LEDs disclosed in LEDTRONICS, Inc. (38.htm), the highest specified wattage appears to be "26 mW" for an LED Chip Code RI851 operating at 850 nm in color, Infrared. All other LEDs listed, whether visible spectrum or otherwise, have lower specified wattages. Thus, none of the LEDs disclosed in LEDTRONICS, Inc. (38.htm) would meet the limitations of Claims 24-26 which require at least 250 mW, 500 mW and 1.0 W of power at full brightness, respectively.

The Examiner's stated rationale regarding why it would be obvious to specify the minimum power ratings of each of the LEDs in Claims 24-26 is in ***direct conflict*** with the limitations in Claims 24-26. Applicant is not claiming an "optimal Wattage value" but rather specifying ***minimum*** wattage values. Applicant is claiming "each of the plurality of LEDs" having minimum specified amounts of power regardless of "overheating".

In Claims 24-26, Applicant is reciting the minimum specified amounts of power as a further limitation on the kind of LEDs that may be used within the array described in Claim 1. One of ordinary skill in the art understands that usually when a wattage

limitation is included in the description of an LED, it refers to the power density of the emitter, which generally correlates with the overall luminous output. Wattage is not conventionally used to refer to LEDs' sensitivity to "overheating."

Applicant respectfully requests clarification regarding the Examiner's reasoning, *i.e.*, that performing "testing to acquire the optimum Wattage values" to "ensure that the LEDs would not overheat", would lead one of skill in the art to select ***minimum*** power ratings as recited in Claim 24-26. It seems readily apparent to the Applicant that if "overheating" were a concern, as asserted by the Examiner, then specifying an ***upper limit*** on power at full brightness would make sense, not specification of a ***miminum*** power rating.

Finally, Claims 24-26 depend from amended Claim 1. Applicant asserts that none of the references of record appears to teach or suggest "relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range" as recited in amended Claim 1. Therefore, Claims 24-26 are also nonobvious over Muthu et al., Amerson et al., Bourn et al. and Walter.

For all of these reasons, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 24-26.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No. 6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter as applied to Claim 1

The Examiner has rejected Claims 27-29 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al., Amerson et al., Bourn et al. and Walter. The Examiner asserts that "one of ordinary skill in the art would recognize that any five or more distinct narrowband colors of LEDs can be plotted and an area enclosed by plotting an output of each LED on a CIE Chromaticity diagram as a point and connecting the points can be generated covering at least 75%, 85% and/or 95% of a total area defined within a

curve of spectrally pure colors and an alychne of purple colors." Office Action, p. 10, last full ¶.

This assertion by the Examiner is factually incorrect. It is NOT true that "any" five or more colors can be plotted to meet such a limitation. Only five or more colors that have been very carefully selected as a collective mix, *i.e.*, five or more colors that meet the limitations of amended Claim 1, and specifically spaced apart from one another, can be plotted to meet such a limitation.

Applicant asserts that there are many conceivable combinations of five or more colors that cannot cover a minimum of 75% of the CIE diagram. For example in FIG. C (below), an array comprised of ultra blue (430nm), super blue (470 nm), aqua green (525 nm) and pure green (555 nm) would only be capable of covering an area less than 50% in the left portion of the CIE diagram, which fails to meet the limitations of Claims 27-29.

FIG. C

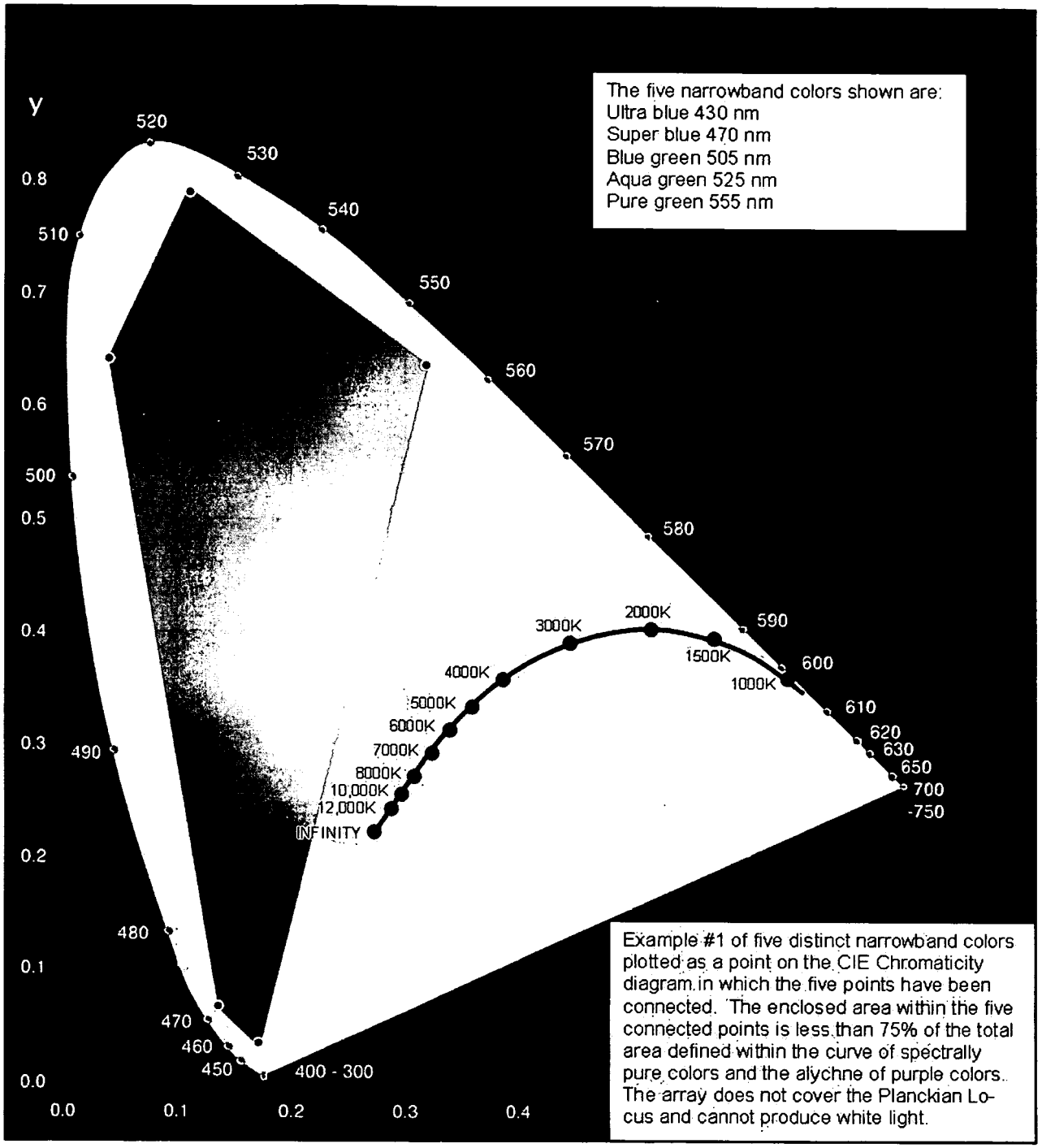
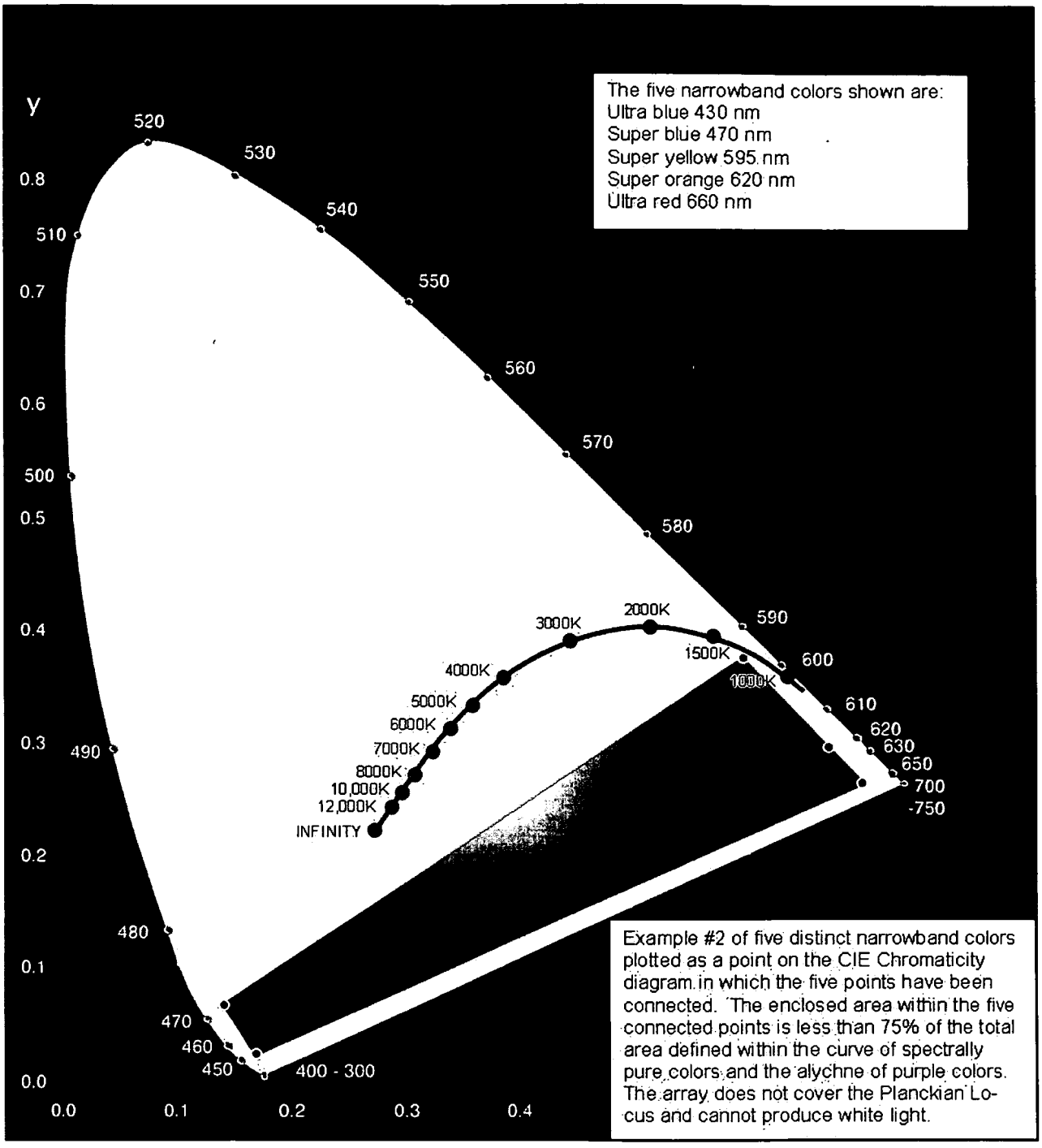


FIG. D below is a second example of an LED array having 5 discrete colors that does not meet the limitations of Claims 27-29. The LED array illustrated in FIG. D is

comprised of the following 5 discrete colors: ultra blue (430 nm), super blue (470 nm), super yellow (595 nm), super orange (620 nm) and ultra red (660 nm.

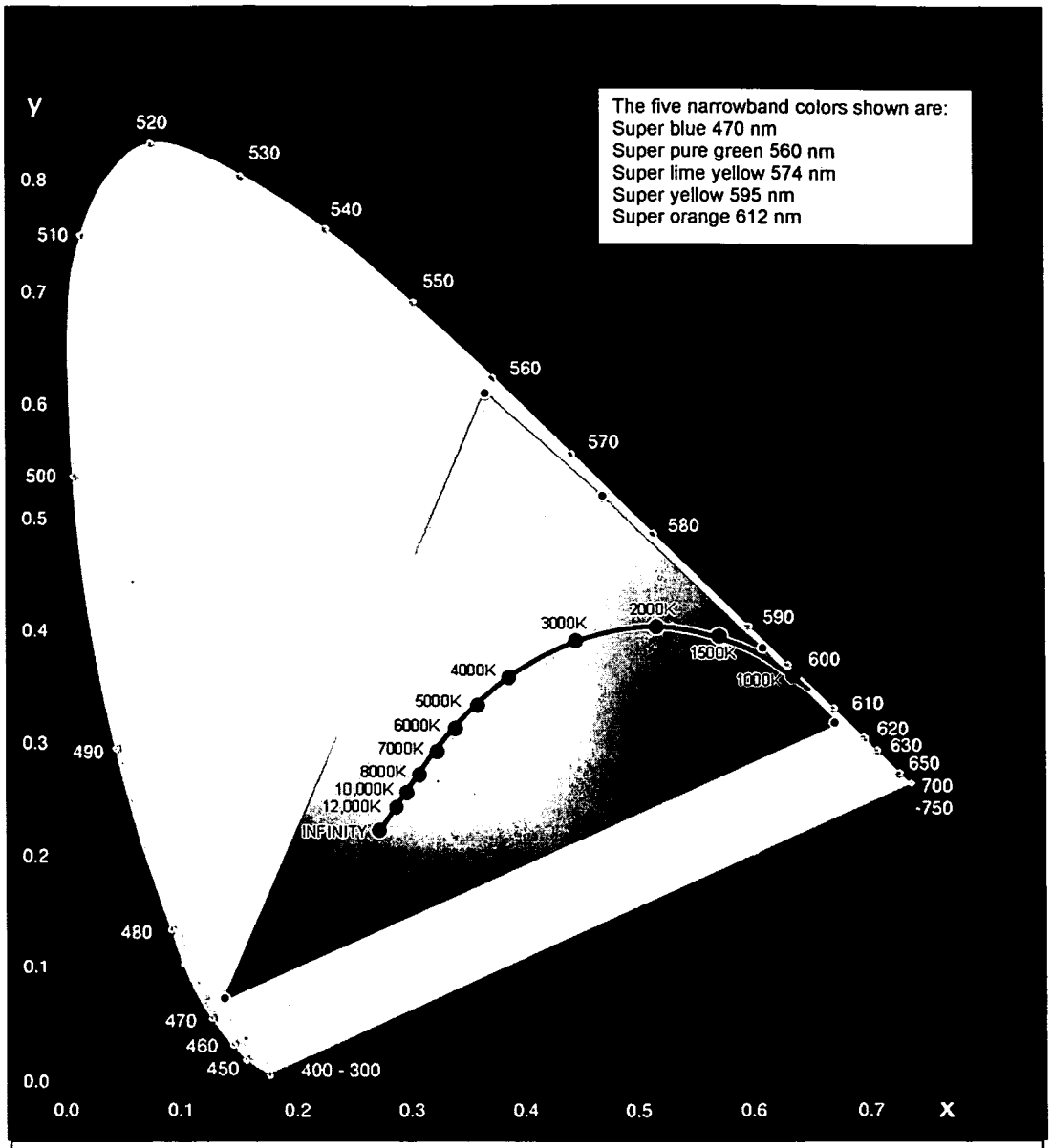
FIG. D



In addition to being very carefully spaced apart from one another across the visible spectrum, in order to meet the limitations of Claims 27-29, the individual colors within the array would also have to be sufficiently narrowband or saturated (*i.e.*, spectrally pure, having a narrow spectral power distribution) to be plotted near the perimeter of the CIE Chromaticity diagram. Any emitters that are not sufficiently narrowband would be plotted nearer the center of the CIE diagram within the pastel-type colors surrounding the white region. Combinations of emitters of this relatively broader-band or unsaturated type would only be capable of covering a small area within the CIE diagram, not the 75% or greater coverage recited in Claims 27-29.

Since Claims 27-29 add further limitations to Claim 1, not only would the five or more narrowband colors have to be carefully spaced apart from one another in order to cover the specified area within the CIE diagram, they would also have to meet the further limitations of Claim 1 and be balanced in their relative brightness such that they produce a white-type composite light ***when all emitters are operating at full intensity*** within the array. This further narrows the scope of the claimed invention and further distinguishes the invention from anything found in the prior art referenced by the Examiner.

FIG. E



Drawing of five narrowband colors plotted as points on the CIE Chromaticity diagram in which the five points have been connected. The relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range. The enclosed area within the five connected points is ***NOT*** at least 75% of the total area defined within the curve of spectrally pure colors and the alychne of purple colors.

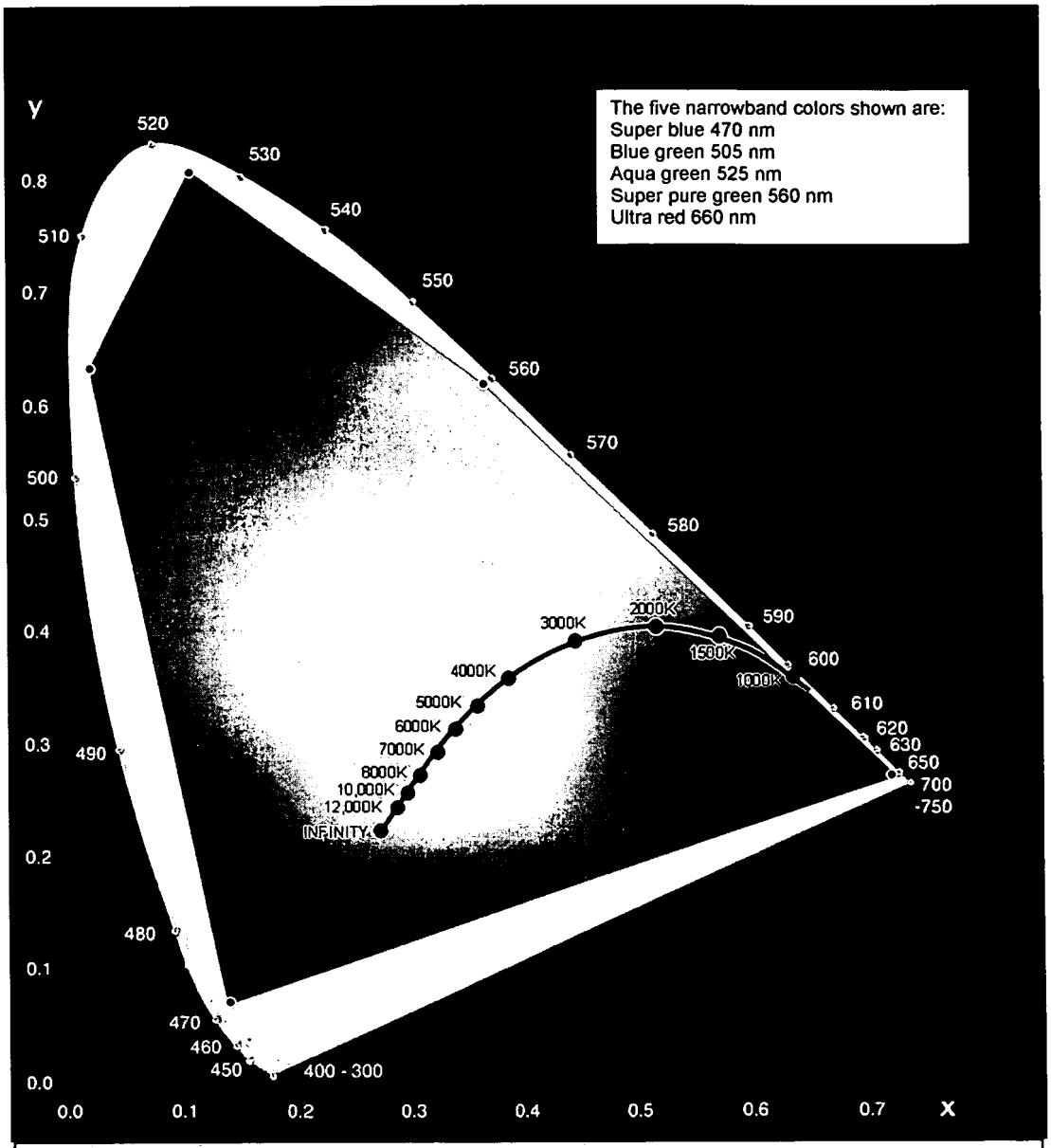
FIG. E (above) is a graphic illustrating an example of a five discrete LED array (see black dots at vertices or along sides of triangle) that satisfies the limitations of amended Claim 1, and yet which does not satisfy all of the limitations of Claim 27. FIG. E illustrates a drawing of five narrowband colors (super blue 470 nm, super pure green

560 nm, super lime yellow 574 nm, super yellow 595nm and super orange 612 nm) plotted as points on the CIE chromaticity diagram. The five points define a roughly triangular area of coverage on the CIE chromaticity diagram. The relative luminance values for all five LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range. Note that the roughly triangular area defined by the five connected points does not cover at least 75% of the total area (triangular area + white background) defined within the curve of spectrally pure colors and the alychne of purple colors.

FIG. F (below) is an example of an LED array that satisfies both the limitations of amended Claim 1 and Claim 27. FIG. F illustrates five discrete colors (super blue 470nm, blue green 505 nm, aqua green 525 nm, super pure green 560 nm and ultra red 660 nm) plotted as points on the CIE Chromaticity diagram. The five points have been connected to form an irregular pentagon defining an area of coverage on the CIE chromaticity diagram. The relative luminance values for all 5 of these LEDs operating at full brightness levels results in a composite white-type light that, when plotted on the CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predetermined correlated color temperature (CCT) range. The area enclosed by the irregular pentagon is at least 75% of the total area (irregular pentagon + white background area).

In view of these arguments and examples, Applicant argues that it would not be obvious for one of ordinary skill in the art to specify an area of coverage on the CIE chromaticity diagram. Furthermore, the Examiner's statement that "one of ordinary skill in the art would recognize that ***any*** five or more distinct narrowband colors of LEDs can be plotted and an area enclosed by plotting an output of each LED on a CIE Chromaticity diagram as a point and connecting the points can be generated covering at least 75%, 85% and/or 95% of a total area defined within a curve of spectrally pure colors and an alychne of purple colors" is false, see FIGS. C-E, above.

FIG. F



Drawing of five narrowband colors plotted as points on the CIE Chromaticity diagram in which the five points have been connected. The relative luminance values for all LEDs within the LED array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range. The enclosed area within the five connected points is at least 75% of the total area defined within the curve of spectrally pure colors and the alychne of purple colors.

Applicant respectfully requests reconsideration of the obviousness rejection of Claims 27-29 in view of Muthu et al., Amerson et al., Bourn et al. and Walter.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No.

6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter as applied to Claim 1 and further in view of LEDTRONICS, Inc. (097b.htm)

The Examiner has rejected Claims 31-34 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al., Amerson et al., Bourn et al. and Walter and further in view of LEDTRONICS, Inc. (097b.htm).

The Examiner asserts that LEDTRONICS, Inc. (097b.htm) teaches or suggests the CIE Chromaticity diagrams from 1931 and 1976 which show the relative luminance values of all LEDs operating at full brightness levels plotted on a CIE Chromaticity diagram and various temperature ranges. The Examiner further asserts that such temperature ranges disclosed in LEDTRONICS, Inc. (097b.htm) "are all optimum or workable ranges, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only ordinary skill in the art." *In re Aller*, 105 U.S.P.Q. 233.

As noted above, Muthu et al., Amerson et al., Bourn et al. and Walter fail to teach all of the limitations of Claim 1. LEDTRONICS, Inc. (097b.htm) does not appear to remedy this lack of a teaching. Claims 31-34 depend from amended Claim 1. For this reason, Applicant asserts that Claims 31-34 are nonobvious for at least the same reasons as Claim 1. For this reason, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 31-34.

Obviousness Rejection Based on U.S. Patent No. 6,441,558 to Muthu et al. in view of U.S. Patent No. 6,379,022 to Amerson et al. and further in view of U.S. Patent No. 6,554,452 to Bourn et al. and U.S. Patent No. 3,757,103 to Walter as applied to Claim 1 and further in view of Pearson Product Moment Correlation Coefficient

The Examiner has rejected Claims 48-53 under 35 U.S.C. § 103(a) as being unpatentable over Muthu et al., Amerson et al., Bourn et al. and Walter and further in view of Pearson Product Moment Correlation Coefficient. More specifically, the Examiner asserts the Muthu et al., Amerson et al., Bourn et al. and Walter teach all the limitations of Claims 48-53 except for using a specific correlation coefficient.

Applicant acknowledges that a correlation coefficient is a well-known concept to one of skill in the art. However, Applicant is not aware of any teaching or suggestion in

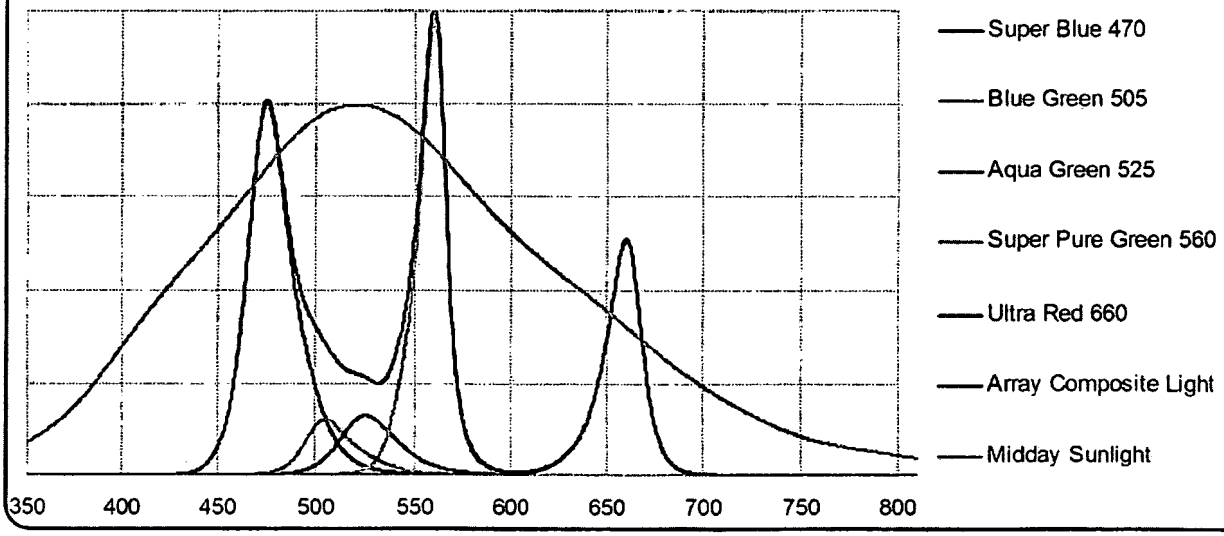
the art of record that specification of a particular correlation coefficient for an LED array meeting the limitations of Claim 1 would be within the knowledge of one of ordinary skill in the art.

Applicant is not merely claiming use of the correlation coefficient in the abstract. Applicant is claiming specific correlation coefficient values (at least .75, .80, .85, .90, or .95) as applied to the LED array recited in Claim 1. Applicant's review of the prior art references of record can find no disclosure or suggestion of producing an LED array that can match the output of midday sunlight with a high correlation coefficient.

To illustrate the claim language used in Claims 48-53, Applicant provides a couple of illustrative examples. FIG. G (below) is a graphic illustrating an LED array

FIG. G

Drawing of an array comprised of 5 narrowband colors of emitters. The relative luminance values for all emitters within the array operating at full brightness levels results in a composite white-type light that, when plotted on a CIE Chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined correlated color temperature (CCT) range.
The composite light has a **Correlation Coefficient of only 0.62** with midday sunlight.



that satisfies the limitations of Claim 1, but does not satisfy the limitations of Claims 48-53. FIG. G illustrates a drawing of an array comprised of five narrowband colors of emitters (super blue 470nm, blue green 505 nm, aqua green 525 nm, super pure green

560 nm and ultra red 660 nm). The relative luminance values for all emitters within this particular array operating at full brightness levels results in a composite white-light that, when plotted on a CIE chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined CCT range. The composite light generated by this array has a correlation coefficient of 0.62 with midday sunlight.

FIG. H

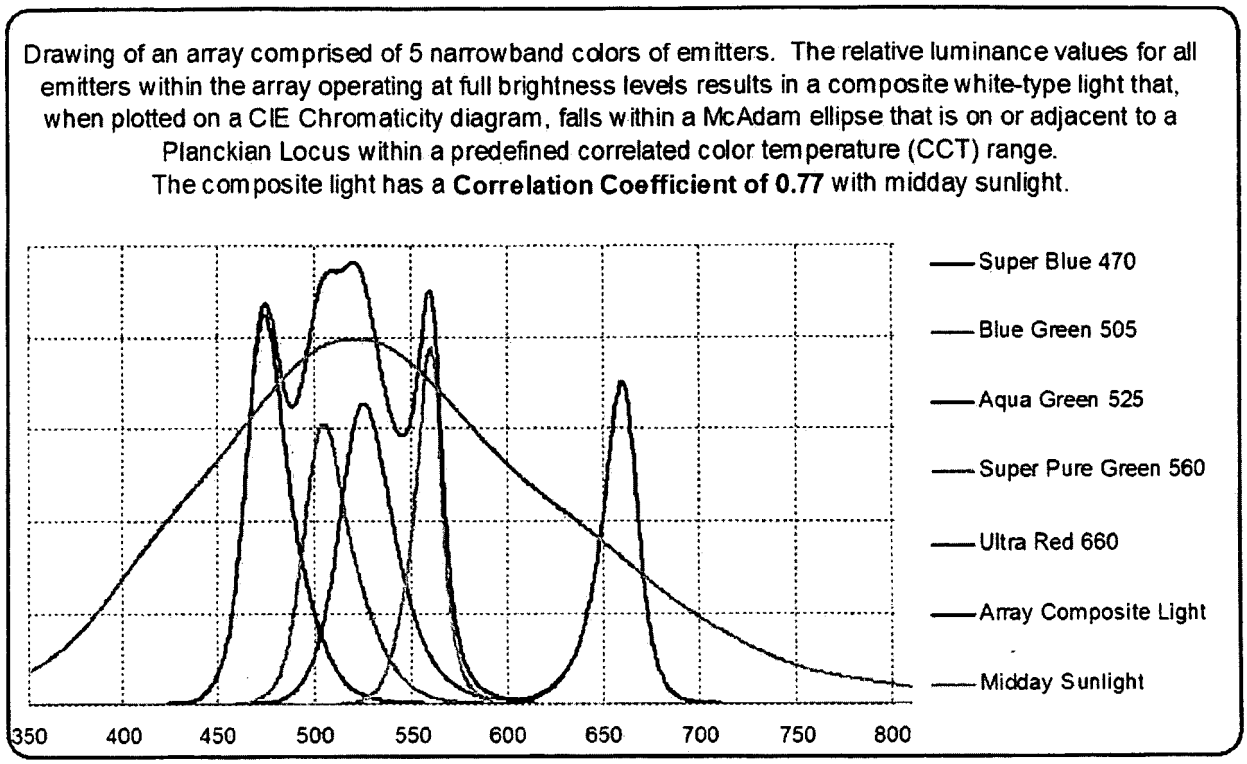


FIG. H, above, is a graphic illustrating an LED array that satisfies the limitations of Claims 1, 48 and 49, but does not satisfy the limitations of Claims 50-53. FIG. H illustrates a drawing of an array comprised of five narrowband colors of emitters (super blue 470 nm, blue green 505 nm, aqua green 525 nm, super pure green 560 nm and ultra red 660 nm). The relative luminance values for all emitters within this particular array operating at full brightness levels results in a composite white-light that, when plotted on a CIE chromaticity diagram, falls within a McAdam ellipse that is on or adjacent to a Planckian Locus within a predefined CCT range. The composite light generated by this array has a correlation coefficient of 0.77 with midday sunlight. It can

be readily appreciated from these two examples that there are many combinations of five or more discrete LEDs that do not meet the limitations Claims 48-53.

Claims 48-53 depend from Claim 1. Thus, Claims 48-53 are believed to be allowable for at least the same reasons as Claim 1. For all these reasons, Applicant respectfully requests reconsideration of the obviousness rejection of Claims 48-53 based on Muthu et al., Amerson et al., Bourn et al. and Walter and further in view of Pearson Product Moment Correlation Coefficient.

CONCLUSION

Claims 1-29, 31-34 and 48-53 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, the Examiner is respectfully invited to contact Applicants' undersigned attorney.

The Commissioner is hereby authorized to charge any additional fee or to credit any overpayment in connection with this Amendment to Deposit Account No. 50-0881.

Respectfully Submitted,

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Enclosure: Petition and Fee for a 3 Month Extension of Time